

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (currently amended) A fuel cell power plant (110, 210, 310, 410) including in
2 combination, a fuel cell stack assembly (~~GSA~~)(12) having an anode region (14), a
3 cathode region (16), and an electrolyte region (18) intermediate the anode and cathode
4 regions; a fuel processing system (~~FPS~~) including combustion-supported reaction
5 means (20, 120) for receiving a supply of fuel (46, 46', 48) and an oxidant stream
6 (124, 224, 324, 424) and for providing a hydrogen-rich fuel stream (22) to the anode
7 region (14); a source of oxidant (26); a primary energy recovery device (~~ERD~~) (30)
8 having adjacent source (32) and sink (34) channels separated by an enthalpy exchange
9 barrier (36) for the transfer of heat and moisture therebetween; a further energy
10 recovery device (~~ERD~~) (50) having means (132, 134, 136) for receiving gas and liquid
11 and flowing at least the gas therethrough in proximity with the liquid for the transfer
12 of heat and moisture therebetween to regulate the dew point of the gas; a source of
13 water (52); at least one of the combustion-supported reaction means (20, 120), the
14 cathode region (16), and the anode region (14) having an exhaust flow (42, 44, 48,
15 148) for providing an exhaust gas stream (28, 128); and wherein the oxidant source
16 (26) is operatively connected to flow through at least the sink channel of the primary
17 energy recovery device ~~ERD~~ (30) to provide the oxidant stream (124, 224, 324, 424)
18 supplied to at least the combustion-supported reaction means (20, 120), the exhaust
19 gas stream (28, 128) is operatively connected to flow through at least the source
20 channel of the primary energy recovery device ~~ERD~~ (30), the water source (52) is
21 operatively connected to provide the liquid to the further energy recovery device ~~ERD~~
22 (50), and the further energy recovery device ~~ERD~~ (50) and one of the source channel
23 (32) and the sink channel(34) of the primary energy recovery device ~~ERD~~ (30) are
24 serially connected (26', 28', 126', 128')for gas flow therethrough, such that the
25 regulation of the dew point of the gas flowing through the further~~supplemental~~ energy
26 recovery device ~~ERD~~ (50) by the water in the further~~supplemental~~ energy recovery

27 deviceERD (50) operates to regulate, at least indirectly, the dew point of the oxidant
28 stream (124, 224, 324, 424) supplied to at least the combustion-supported reaction
29 means (20, 120).

1 2. (currently amended) The fuel cell power plant (110, 210, 310, 410) of
2 claim 1 wherein the further energy recovery deviceERD (50) is upstream of the
3 primary energy recovery deviceERD (30) relative to the gas flow therethrough, the
4 exhaust gas stream (28, 128) flows through the further energy recovery deviceERD
5 (50), and the regulation of the dew point of the oxidant stream (124, 224, 324, 424) is
6 indirect.

1 3. (currently amended) The fuel cell power plant (110, 210, 310, 410) of
2 claim 1 wherein the primary energy recovery deviceERD (30) is upstream of the
3 further energy recovery deviceERD (50) relative to the gas flow therethrough, oxidant
4 from source (26) flows through the further energy recovery deviceERD (50), and the
5 regulation of the dew point of the oxidant stream (124, 224, 324, 424) is direct.

1 4. (original) The fuel cell power plant (110, 210, 310, 410) of
2 claim 1 wherein the oxidant stream (124, 224, 324, 424) applied to the combustion-
3 supported reaction means (20, 120) is also applied, in parallel, to the cathode region
4 (16).

1 5. (original) The fuel cell power plant (110, 210, 310, 410) of
2 claim 1 wherein the combustion-supported reaction means (20) comprises a catalytic
3 steam reformer (40) and separate burner (38), and the burner (38) has an exhaust flow
4 (42).

1 6. (original) The fuel cell power plant (110, 210, 310, 410) of

2 claim 5 wherein the cathode region (16) has an exhaust flow 44, the cathode exhaust
3 gas flow (44) and the burner exhaust flow (42) being combined to form the exhaust
4 gas stream (28).

1 7. (original) The fuel cell power plant (110, 210, 310, 410) of
2 claim 1 wherein the combustion-supported reaction means (120) comprises a
3 reformer (120) structured for integral combustion therewithin.

1 8. (original) The fuel cell power plant (110, 210, 310, 410) of
2 claim 7 wherein the reformer (120) is from the group consisting of an autothermal
3 reformer and a catalytic partial oxidizer.

1 9. (original) The fuel cell power plant (110, 210, 310, 410) of
2 claim 7 wherein the anode exhaust flow (148) comprises a partly-depleted hydrogen
3 gas stream, and the cathode exhaust flow (44) and the anode exhaust flow (148) are
4 combustively reacted in a burner (60) to provide the exhaust gas stream (128).

1 10. (currently amended) The fuel cell power plant (110, 210, 310, 410) of claim 1
2 wherein the further energy recovery device~~ERD~~ (50) comprises adjacent liquid (132)
3 and gas (134) channels separated by an enthalpy exchange barrier (136), the gas flows
4 through the gas channel (134), the water flows through the liquid channel (132), and
5 the transfer of heat and moisture therebetween is via the enthalpy exchange barrier
6 (136).

1 11. (currently amended) The fuel cell power plant (110, 210, 313, 410) of
2 claim 10 wherein the enthalpy exchange barrier (36, 136) in each of the primary
3 energy recovery device~~ERD~~ (30) and the further energy recovery device~~ERD~~ (50)
4 comprises a fine pore saturator medium.

1 12. (currently amended) The fuel cell power plant (110, 210, 310, 410) of

2 claim 1 wherein the temperature of the water supplied to the further energy recovery
3 device~~ERD~~ (50) regulates the dew point of the oxidant stream (124, 224, 324, 424)
4 supplied to at least the combustion-supported reaction means (20, 120).

1 13. (currently amended) A fuel cell power plant (110, 210, 310, 410) including in
2 combination, a fuel cell stack assembly (CSA)(12) having an anode region (14), a
3 cathode region (16), and an electrolyte region (18) intermediate the anode and cathode
4 regions; a fuel processing system (~~FPS~~) including combustion-supported reaction
5 means (20, 120) for receiving a supply of fuel (46, 46', 48) and an oxidant stream
6 (124, 224, 324, 424) and for providing a hydrogen-rich fuel stream (22) to the anode
7 region (14); a source of oxidant (26); a primary energy recovery device (~~ERD~~) (30)
8 having adjacent source (32) and sink (34) channels separated by an enthalpy exchange
9 barrier (36) for the transfer of heat and moisture therebetween; a further energy
10 recovery device (~~ERD~~) (50) having adjacent liquid (132) and gas (134) channels
11 separated by a fine pore saturator medium enthalpy exchange barrier (36, 136) for the
12 transfer of heat and moisture therebetween to regulate the dew point of the gas
13 flowing in the gas channel (134) as a function of the liquid; a source of water (52); at
14 least one of the combustion-supported reaction means (20, 120), the cathode region
15 (16), and the anode region (14) having an exhaust flow (42, 44, 48, 148) for providing
16 an exhaust gas stream (28, 128); and wherein the oxidant source (26) is operatively
17 connected to flow through at least the sink channel of the primary energy recovery
18 device~~ERD~~ (30) to provide the oxidant stream (124, 224, 324, 424) supplied to at least
19 the combustion-supported reaction means (20, 120), the exhaust gas stream (28, 128)
20 is operatively connected to flow through at least the source channel of the primary
21 energy recovery device~~ERD~~ (30), the water source (52) is operatively connected to
22 flow at a controlled temperature through the liquid channel (132) of the further energy
23 recovery device~~ERD~~ (50), and the gas channel (134) of the further energy recovery
24 device ~~ERD~~ (50) and one of the source channel (32) and the sink channel(34) of the
25 primary energy recovery device~~ERD~~ (30) are serially connected (26', 28', 126', 128')
26 for gas flow therethrough, such that the regulation of the dew point of the gas flowing
27 through the ~~further supplemental~~ energy recovery device~~ERD~~ (50) by the temperature

28 of the water in the ~~further supplemental~~ energy recovery device ~~ERD~~ (50) operates to
29 regulate, at least indirectly, the dew point of the oxidant stream (124, 224, 324, 424)
30 supplied to at least the combustion-supported reaction means (20, 120).

1 14. (currently amended) In a fuel cell power plant (110, 210, 310, 410) including in
2 combination, a fuel cell stack assembly (CSA) (12) having an anode region (14), a
3 cathode region (16), and an electrolyte region (18) intermediate the anode and cathode
4 regions; a fuel processing system ~~(FPS)~~ including combustion-supported reaction
5 means (20, 120) for receiving a supply of fuel (46, 46', 48) and an oxidant stream
6 (124, 224, 324, 424) and for providing a hydrogen-rich fuel stream (22) to the anode
7 region (14); a source of oxidant (26); a primary energy recovery device ~~(ERD)~~ (30)
8 having adjacent source (32) and sink (34) channels separated by an enthalpy exchange
9 barrier (36) for the transfer of heat and moisture therebetween; at least one of the
10 combustion-supported reaction means (20, 120), the cathode region (16), and the
11 anode region (14) having an exhaust flow (42, 44, 48, 148) for providing an exhaust
12 gas stream (28, 128), the exhaust gas stream (28, 128) being operatively connected to
13 flow through at least the source channel (32) of the primary energy recovery
14 device ~~ERD~~ (30); and wherein the oxidant source (26) is operatively connected to flow
15 through at least the sink channel (34) of the primary energy recovery device ~~ERD~~ (30)
16 to provide the oxidant stream (124, 224, 324, 424) supplied to at least the combustion-
17 supported reaction means (20, 120), the method of regulating the dew point of the
18 oxidant stream (124, 224, 324, 424) supplied to at least the combustion-supported
19 reaction means (20, 120) comprising the step of:

20 a) passively condensing (50) moisture from a gas stream (28, 128, 26', 126'),
21 the gas stream being one or the other of:

- 22 i) the oxidant stream (26', 126') downstream of the flow of the oxidant
23 source (26) through the sink channel (34) of the primary energy recovery device ~~ERD~~
24 (30), thereby to effect direct regulation of said dew point; or
25 ii) the exhaust gas stream (28, 128) upstream of the flow of the exhaust
26 gas stream (28', 128') through the source channel (32) of the primary energy recovery
27 device ~~ERD~~ (30), thereby to effect indirect regulation of said dew point.

1 15. (original) The method of claim 14 wherein the step of passively condensing (50)
2 moisture from a gas stream (28, 128, 26', 126') comprises flowing (134) said gas
3 stream in proximity with a liquid (52, 132) in a manner to effect a transfer (136) of
4 heat and moisture between said liquid and gas streams as a function of at least the
5 temperature of said liquid relative to said gas stream.

1 16. (original) The method of claim 15 wherein the liquid (52) is water and the
2 temperature of said water is regulated to effect the condensation needed to regulate the
3 dew point of the oxidant stream (124, 224, 324, 424) supplied to at least the
4 combustion-supported reaction means (20, 120).

1 17. (currently amended) The method of claim 15 wherein the liquid is water (52) and
2 the step of passively condensing moisture from a gas stream comprises flowing (134)
3 the gas stream (28, 128, 26', 126') and flowing (132) the water (52) along respectively
4 opposite sides of a porous enthalpy exchange barrier (136) of a ~~further~~supplemental
5 energy recovery device (50) to effect said transfer of heat and moisture.

1 18. (currently amended) The method of claim 15 wherein the liquid is water (52) and
2 the gas stream from which moisture is passively condensed (50) comprises the exhaust
3 gas stream (28, 128) upstream of the flow of the exhaust gas stream (28', 128')
4 through the source channel (32) of the primary energy recovery device~~ERD~~ (30),
5 thereby to effect indirect regulation of said dew point.